Also, in the first embodiment, the chamfered form has been in the flat plane. However, the chamfered form is not limited to the flat plane. For example, the chamfered form may otherwise be such a curved surface that, when projected to a plane (X-Y plane) defined by the X direction of grating arrangement of the grating surface and a Y direction in the normal to the substrate, it becomes a curved line as shown in Fig. 12. That is, a round form in the X-Y plane may be used with a minute radius of curvature r. In this case, too, it is preferred that the same as the above-described chamfered amount for the flat plane apply to the radius r of the curved surface, lying in the following range:

$$0.5\ \mu m < r < 2\ \mu m$$

IN THE CLAIMS:

Please add new Claims 20 to 22, as follows. For the Examiner's convenience, all of the pending claims are provided below.

1. A diffractive optical element, comprising:

a diffractive grating portion having a pair of diffractive gratings, said pair of diffractive gratings differing in dispersion from each other, and said pair of diffractive gratings confronting each other through a space of a refractive index of 1,

wherein a maximum optical path length difference occurring in said pair of diffractive gratings with respect to each of at least two wavelengths is m (integer) times the wavelength, and values of m in the two wavelengths are the same.

2. A diffractive optical element, comprising:

a diffractive grating portion having a pair of diffractive gratings, said pair of diffractive gratings differing in dispersion from each other, and said pair of diffractive gratings confronting each other through a space of a refractive index of 1,

wherein a maximum optical path length difference occurring in said pair of diffractive gratings with respect to each of at least two wavelengths is m integer times the wavelength, and values of m in the two wavelengths are the same, and peak portions and valley portions of said pair of diffractive gratings are formed in a chamfered shape.

3. A diffractive optical element, comprising:

a diffractive grating portion having a pair of diffractive gratings, said pair of diffractive gratings differing in dispersion from each other, and said pair of diffractive gratings confronting each other,

wherein a maximum optical path length difference occurring in light passing through said pair of diffractive gratings with respect to each of at least two wavelengths is m (integer) times the wavelength, and values of m in the two wavelengths are the same, and peak portions and valley portions of said pair of diffractive gratings are formed in a chamfered shape.

4. A diffractive optical element, comprising:

a diffractive grating portion having a pair of diffractive gratings, said pair of diffractive gratings differing in dispersion from each other, and said pair of diffractive gratings confronting each other through a space of a refractive index of 1,

wherein a maximum optical path length difference occurring in said pair of diffractive gratings with respect to each of at least two wavelengths is m (integer) times the wavelength, and values of m in the two wavelengths are the same, and peak portions of said pair of diffractive gratings are formed in a chamfered shape.

5. A diffractive optical element, comprising:

a diffractive grating portion having a pair of diffractive gratings, said pair of diffractive gratings differing in dispersion from each other, and said pair of diffractive gratings confronting each other through a space of a refractive index of 1,

wherein a maximum optical path length difference occurring in said pair of diffractive gratings with respect to each of at least two wavelengths is m (integer) times the wavelength, and values of m in the two wavelengths are the same, and valley portions of said pair of diffractive gratings are formed in a chamfered shape.

6. A diffractive optical element, comprising:

a diffractive grating portion having a pair of diffractive gratings, said pair of diffractive gratings differing in dispersion from each other, and said pair of diffractive gratings confronting each other,

wherein a maximum optical path length difference occurring in light passing through said pair of diffractive gratings with respect to each of at least two wavelengths is m (integer) times the wavelength, and values of m in the two wavelengths are the same, and peak portions of said pair of diffractive gratings are formed in a chamfered shape.

7. A diffractive optical element, comprising:

a diffractive grating portion having a pair of diffractive gratings, said pair of diffractive gratings differing in dispersion from each other, and said pair of diffractive gratings confronting each other,

wherein a maximum optical path length difference occurring in light passing through said pair of diffractive gratings with respect to each of at least two wavelengths is m (integer) times the wavelength, and values of m in the two wavelengths are the same, and valley portions of said pair of diffractive gratings are formed in a chamfered shape.

9. A diffractive optical element, comprising:

a diffractive grating portion having a pair of diffractive gratings, said pair of diffractive gratings differing in dispersion from each other, and said pair of diffractive gratings confronting each other through a space of a refractive index of 1,

wherein a maximum optical path length difference occurring in said pair of diffractive gratings with respect to each of at least two wavelengths is m (integer) times the wavelength, and values of m in the two wavelengths are the same, peak portions of one of said pair of diffractive gratings are formed in a chamfered shape, and valley portions of the other of said pair of diffractive gratings are formed in a chamfered shape.

10. A diffractive optical element, comprising:

a diffractive grating portion having a pair of diffractive gratings, said pair of diffractive gratings differing in dispersion from each other, and said pair of diffractive gratings confronting each other,

wherein a maximum optical path length difference occurring in light passing through said pair of diffractive gratings with respect to each of at least two wavelengths is m (integer) times the wavelength, and values of m in the two wavelengths are the same, peak portions of one of said pair of diffractive gratings are formed in a chamfered shape, and valley portions of the other of said pair of diffractive gratings are formed in a chamfered shape.

11. A diffractive optical element for diffracting light of a specific order with a high diffraction efficiency, comprising:

a diffractive grating portion having a pair of diffractive gratings, said pair of diffractive gratings differing in dispersion from each other, and said pair of diffractive gratings confronting each other through a space of a refractive index of 1,

wherein a maximum optical path length difference occurring in said pair of diffractive gratings with respect to each of at least two wavelengths is m (integer) times the wavelength, and values of m in the two wavelengths are the same, wherein said integer is the number of said specific order.

12. A blazed type diffractive optical element, comprising:

a diffractive grating portion having a pair of diffractive gratings, said pair of diffractive gratings differing in dispersion from each other, and said pair of diffractive gratings confronting each other through a space of a refractive index of 1,

wherein a maximum optical path length difference occurring in light passing through said pair of diffractive gratings with respect to each of at least two wavelengths is m (integer) times the wavelength, and values of m in the two wavelengths are the same.

13. An optical system, comprising:

a diffractive optical element according to one of claims 1 to 7 and 9 to 12; and

a lens systems.

14. An optical system according to claim 13, wherein each of said at least two wavelengths are within a visible range.

15. An optical system according to claim 13, wherein one of said pair of diffraction gratings is made of resin.

16. An optical system according to claim 13, wherein each of said pair of diffraction gratings are made of resin.

17. An optical system according to claim 13, wherein said optical element corrects chromatic aberration in said lens system.

18. An optical system, comprising: a diffractive optical element according to any one of claims 2-7, 9, 10 and 20-22; and

a lens system,

wherein each of said pair of diffractive gratings comprises a flat surface, and a length a of said flat surface in a direction of grating arrangement of each diffractive grating is $0.5\ \mu m < a < 2\ \mu m$.

19. An optical system, comprising:

a diffractive optical element according to any one of claims 2-7, 9, 10 and 20-22; and

a lens system,

wherein each of said pair of diffractive gratings comprises a curved surface, and a radius of curvature r of said curved surface on a cross sectional plane including a direction of grating arrangement of each diffractive grating is $0.5\ \mu m < r < 2\ \mu m$.

Sub E3

--20. A diffractive optical element, comprising:

a diffractive grating portion having a plurality of diffractive grating layers laminated with a space layer of refractive index of 1, said plurality of diffractive layers differing in dispersion from each other,

wherein a maximum optical path length difference occurring with respect to at least two wavelengths in said diffractive grating portion is m (integer) times the wavelength, and values of m in the two wavelengths are the same.

21. A diffractive optical element, comprising:

a diffractive grating portion having a plurality of diffractive grating layers laminated with a space layer of refractive index of 1, said plurality of diffractive grating layers differing in dispersion from each other,

wherein said diffractive grating portion is formed on a light transmitting surface of a lens.

22. A diffractive optical element, comprising:

a diffractive grating portion having a plurality of diffractive grating layers laminated with a space layer of refractive index of 1, said plurality of diffractive grating layers differing in dispersion from each other,

wherein said diffractive grating portion is formed on a light transmitting surface of a lens, and a maximum optical path length difference occurring with respect to at least two wavelengths in said diffractive grating portion is m (integer) times the wavelength, and values of m in the two wavelengths are the same.--